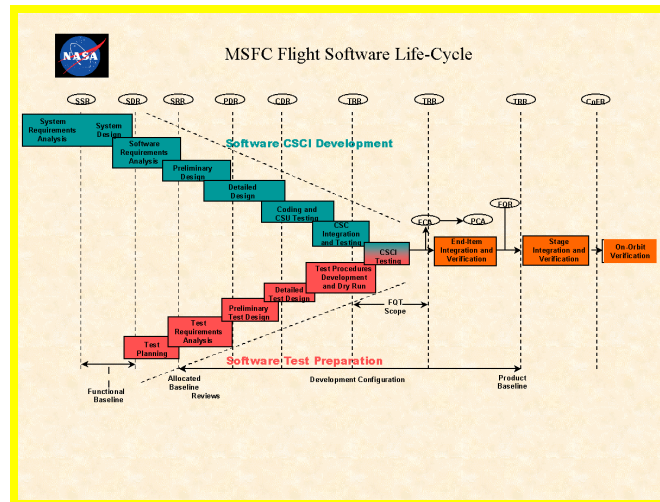


Verification & Validation of Embedded Real-Time, Commercial-Off-The-Shelf Operating Systems for Space Flight Projects



Objective

The multiple space flight programs are utilizing commercial off-the-shelf real-time operating systems to reduce development cost of the flight software. These operating systems need to undergo the same level of verification as the flight software application code. This task will look at how commercial real-time embedded operating systems are tested, develop a set of generic software requirements for any real-time embedded operating system, and finally develop a set of test procedures to evaluate any proposed or existing real-time embedded operating system. This task will accomplish these objectives in the following steps: 1) evaluate the amount of software testing performed by vendors of embedded real-time commercial operating systems, 2) develop a set of generic testable software requirements for embedded flight real-time operating systems, and 3) develop a test suite which can be used for verification of candidate operating systems against the set of generic requirements identified in step 2.

Why Needed

The International Space Station (ISS) Urine Processor Assembly (UPA) project and Microgravity projects plan to use the VxWorks commercial operating system. VxWorks is currently being used by the Space Transportation project in the propulsion controller software being executed during the Fastrac engine testing at Stennis Space Center. Very little is currently known concerning how much testing the VxWorks vendor has performed, what documentation exists concerning the vendor testing, and what process the vendor uses to inform customers of user-discovered problems. In addition, many flight projects have very similar requirements for embedded real-time operating system capabilities. This software initiative provides research into operating system software requirements developed for past flight projects to determine a "best" approach for documenting a generic set of software requirements for a real-time embedded operating system. This generic set of software requirements can then be used as a basis for verification of candidate commercial operating systems. The resulting test suite can be used to verify candidate operating systems against a well-understood set of requirements. The generic set of software requirements and test cases can easily be modified as appropriate for re-use on future flight projects.

Point of Contact

Tim Crumbley / ED14
Phone: 256-544-5978
Email: tim.crumbley@msfc.nasa.gov

Sponsor

NASA Software Assurance Program